



## SUMMARY

The catch monitoring through port sampling activities on southern Bluefin tuna (SBT) in Benoa during September 2014 to April 2015 revealed that size distribution of SBT ranged from 57 to 241 cmFL. Regular length measurements during period of 1998-2015 showed that the mean length in 2014 tend to shift to a smaller size of 153 cm FL. Monthly landing occurred in a similar pattern with lower volume compared previous year of landings. Enumeration on length frequency measurements indicated that a significant portion of fish size of <100 cm caught during September 2014 in statistical area I. Number of active vessels in the port of Benoa in 2014 is relatively the same as in 2011 and 2012. Onboard observer carried out on CCSBT authorized fishing vessels for 75 days and 13<sup>o</sup> south latitude was the highest latitude and 112<sup>o</sup> East in the far west longitude. CDS data shows the estimate total catches in 2014 at about 11573 individual SBT with total weight of 1,063 tons. The catches recorded from 172 unit of longliner with range between 14 to 585 GT where 23% harvested by the largest vessel size and 18% by vessel size of ≤30 GT.

### 1. Introduction

Southern Bluefin Tuna (*Thunnus maccoyii*, SBT) is one of tuna species caught seasonally by the tuna longliners operated in Indian Ocean. Among tuna fishing ports, this year all SBT catches only available from Benoa port. This report provides updated information of national estimation on catch of SBT mainly in Benoa port based on regular enumeration and onboard observer activities and including estimation on national capture fisheries statistics and CDS data during the year of harvest of 2014. SBT catch monitoring on length frequency measurement regularly conducted by RITF, estimated catch and effort by statistical areas including list of ecological related species were presented in this paper.

### 2. Catch and Effort

Port sampling and monitoring on catch of SBT continuously applied and the result showed that the estimated monthly landing slightly shifted with previous years (see Satria *et al.*, 2011, 2012, 2013; Nugroho *et al.*, 2014). The highest landing in 2014 occurred in December 2014 and the low landing was in May. The pattern of monthly fluctuation is similar with the 5 consecutive years (2008 – 2014) except in December 2014 was the landing data so far (Figure 1).

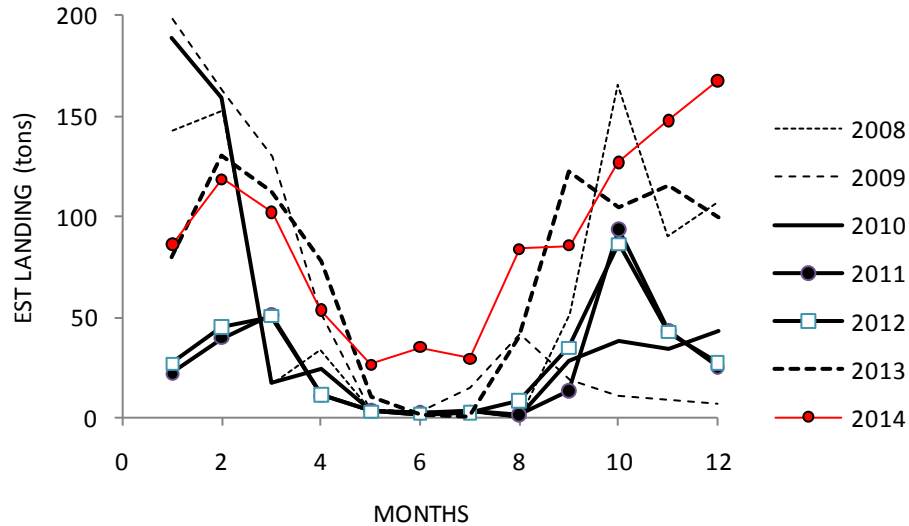


Figure 1. Monthly landing of SBT at Benoa in 2008 – 2014.

This figure constantly explained that SBT being more abundant on the fishing grounds and more significant proportion of the overall tuna catch during the SBT spawning season, which is generally occurred during September to April. The annual catch during 2004 – 2014 is showed in Appendix 1.

Fishing effort represented by number of landing vessels showed that the number is relatively stable at low level (25% to 2004) since 2010 (Figure 2). Numbers of tuna longliner vessels that landing during 2014 were 858 units, while 521 units (60.72%) were enumerated. The Southern Bluefin Tuna CDS data indicated that 172 Tuna Longliner dealt with this species. The main catch were harvested from statistical area 1 (75.3%) with length ranged of 40 to 300 cmFL followed by area 2 (23.4%) of 80 to 188 cmFL and 8 (1.3%) of 121 to 175 cmFL.

Catch by size of vessel indicated that 25% of SBT were caught by large vessel with size of  $\geq 200$  GT which operated in area II and VIII, 18% ( $<30$ GT), 33% (30-100 GT) and 25% (100-200 GT) operated in area I (Figure 3).

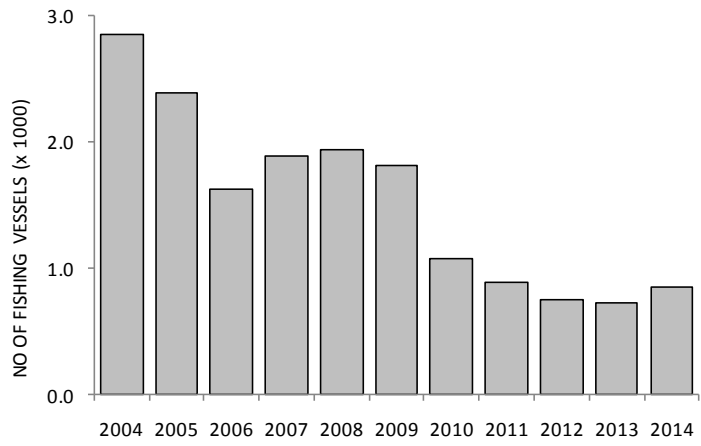


Figure 2. Number of tuna longliner landing at Bena fishing port 2014  
Source: RITF (2014).

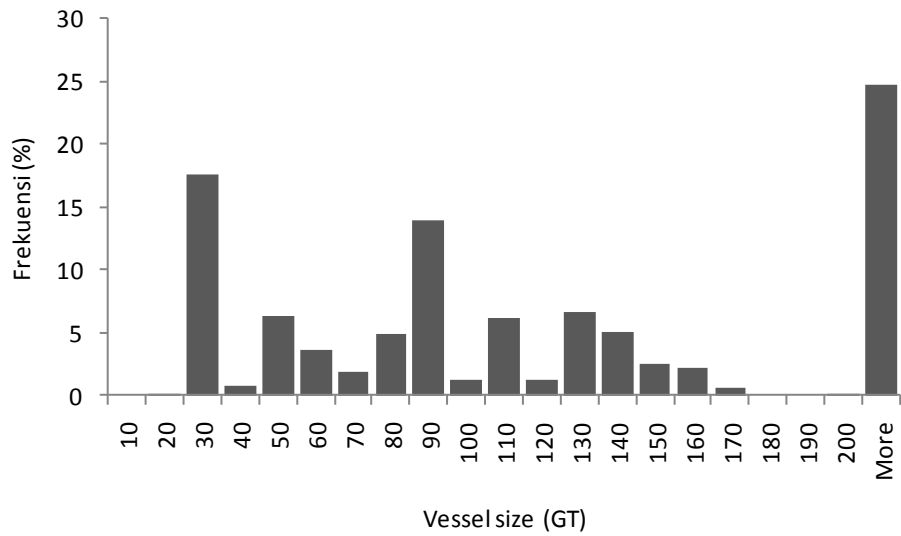


Figure 3. Frequency distribution of catch by vessel size

The distribution of catches in number and weight and other relevant data by those three statistical areas were showed in Table 1.

Table 1. Catch and effort distribution by statistical areas

CCSBT STAT	HARVEST PERIOD	FV	Hk	Number of Fish	Est. Weight (kg)	Est. Whole Weight (kg)	L & W	Max	Min	Average	sd
Area - I	Jan - Dec 2014	170	na	7537	697771	802437	FL (cm)	300	40	171	29.06
							W (kg)	269	15	93	35.88
							Ww (kg)	309	17	108	42.78
Area - II	Mar - Oct 2014	1	na	2032	104788	120506	FL (cm)	188	80	136	21.13
							W (kg)	139	14	52	23.13
							Ww (kg)	160	16	59	26.60
Area - VIII	June - July 2014	1	na	2004	122065	140375	FL (cm)	199	22	145	16.89
							W (kg)	150	18	61	20.29
							Ww (kg)	173	21	70	23.33

Remarks :

- Fv : Number of active fishing vessels
- Hk : Number of hooks
- L&W : Length and Weight
- na : not available
- W : Estimated weight
- Ww : Estimated whole weight

### 3. Length frequency distribution

Port sampling program during September 2014 to April 2015 measured a total of 13622 specimens weighted to the nearest kilograms. During this fishing season, the length distribution shows slightly different compare to the last three years of sampling. The frequency distribution presented in Appendix 2.

The size frequency during period of September 2014 to April 2015 ranged between 57 cm to 225 cmFL with mean of 153 cmFL. As explained in previous national reports (see: Satria *et al.*, 2011; 2012; 2013 and Nugroho *et al.*, 2014) the minimum size from size frequency distribution in 2010-2011 there was no specimens with size of less than 100 cmFL. In this year fishing season particularly in September showed there were specimens of with size less than 100 cm (FL) that caught in statistical area I. The annual trend of fish size revealed that the mean size of SBT steady decrease through year from 182 cm FL in the 90's decreased to 153cm FL in 2014-2015. (Figure 4).

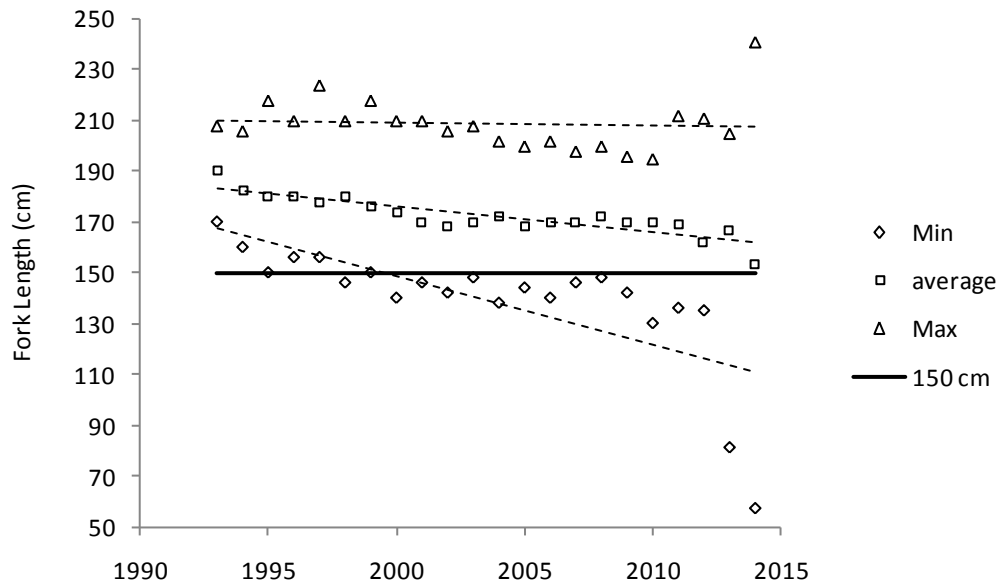


Figure 4. Updated Annual trend of average size of SBT landed in Benoa during 1993 - 2014

#### 4. Scientific Observer

Regular scientific observer activity in 2014 deployed in five trips and two of them were on authorized fishing vessels. Day at sea ranged from 29 to 90 fishing days per trip with total efforts of 194,772 hooks. Geographically, observation covered the fishing ground from 10 to 13° South and 112 to 121° East (Table 2). The previous year showed that the highest latitude up to 40° S (see: Sadiyah *et al.*, 2007; Satria *et al.*, 2011; 2012; 2013).

Table 2. Observer activities in authorized Fishing Vessels in 2014.

Trip	Base	Date	DAS	No of setting	No of Hooks	No of SBT	HR	Fishing ground
1st	Benoa	8 Mar 2014	29	16	25,500	12	0.47	Eastern IO
2nd	Benoa	12 Apr 2014	32	22	23,052	0	0	Eastern IO
3rd	Benoa	14 May 2014	46	27	27,648	0	0	Eastern IO
4th	Benoa	2 Jun 2014	45	32	33,408	0	0	Eastern IO
5th	Benoa	17 Aug 2014	90	72	85,164	0	0	Eastern IO

#### Hook rates

Hook-rates were only available to estimate based on observer activity. As shown in Table 3, total number of 12 SBT caught during the observations. The highest catch appeared in 1st trip which carried out in April 2014. Data were obtained based on

deploying of 25,500 numbers of hooks. Even if the limited sample were observed during fishing season 2014, the data showed that hook rates of SBT ranging from 0 to 0.47.

Table 3. Estimated Hook-rates of SBT by observer trip on fishing vessels

SBT					
TRIP	n	HR	Length (cmFL)		
			Average	Min	Max
1	12	0.47	172.67	118	190
2	-	-	-	-	-
3	-	-	-	-	-
4	-	-	-	-	-
5	-	-	-	-	-

Remarks: HR = Hook rate  
 - = no SBT

### Ecological related species

Several ecological related species were caught during onboard observation. The species were dominated by Lancet fish (NGA *Alopiasaurus sp.*) 31%, Escolar (*Lepidocybium flavobrunneum*) 23% and Pelagic stingray (DAV *Dasyatis violacea*) 17% and Pomfrets (Bramidae) 8%. Hook rates based on onboard observer presented in table 4.

Table 4. Hook rates of some ecological related species

TRIP	No of hooks	DAV	NGA	SBF	HAR	LKV	MOX	TRF	MON	CSK	LEC
1	25,500	54	71	12	0	0	1	0	1	17	0
2	23,052	73	216	0	0	3	0	1	1	7	77
3	27,648	182	81	0	3	1	0	0	10	10	36
4	33,408	159	177	0	0	8	2	0	3	3	107
5	85,164	20	285	0	0	0	0	0	8	44	107

Hook-rates

1	6.12	2.12	2.78	0.47	0	0	0.04	0	0.04	0.67	0
2	16.40	3.17	9.37	0	0	0.13	0	0.04	0.04	0.30	3.34
3	11.68	6.58	2.93	0	0.11	0.04	0	0	0.36	0.36	1.30
4	13.70	4.76	5.30	0	0	0.24	0	0	0.09	0.09	3.20
5	8.21	0.23	3.35	0	0	0	0	0	0.09	0.52	3.20

Source: RITF (2014)

Total number of 2398 ERS specimens were recorded during observation. List of ecological related species listed in Appendix 3.

## 5. Catch Documentation scheme (CDS)

CDS data indicated that the all fish certified in Benoa. Monthly harvested were showed in table 5 with annual catch estimate in 2014 at about 1,063 tons. The highest catch occurred in December (167 tons) and the lowest landing were on May (23 tons) and July (26 tons) as presented in Table 5. .

Table 5. CDS Report of SBT (January- December 2014).

Month	TOTAL			BALI			JAKARTA		
	Number	Net Weight (kg)	Estimated Whole Weight (kg)	Number	Net Weight (kg)	Estimated Whole Weight (kg)	Number	Net Weight (kg)	Estimated Whole Weight (kg)
JAN-14	903	75,038	86,294	903	75,038	86,294	-	-	-
FEB-14	1,153	103,206	118,687	1,153	103,206	118,687	-	-	-
MAR-14	939	88,854	102,182	939	88,854	102,182	-	-	-
APR-14	496	46,523	53,501	496	46,523	53,501	-	-	-
MAY-14	266	22,815	26,237	266	22,815	26,237	-	-	-
JUN-14	465	30,502	35,078	465	30,502	35,078	-	-	-
JUL-14	305	25,662	29,511	305	25,662	29,511	-	-	-
AUG-14	1,119	73,008	83,959	1,119	73,008	83,959	-	-	-
SEP-14	1,195	74,542	85,723	1,195	74,542	85,723	-	-	-
OCT-14	1,278	110,369	126,924	1,278	110,369	126,924	-	-	-
NOV-14	1,480	128,501	147,776	1,480	128,501	147,776	-	-	-
DEC-14	1,974	145,604	167,445	1,974	145,604	167,445	-	-	-
<b>TOTAL</b>	<b>11,573</b>	<b>924,624</b>	<b>1,063,318</b>	<b>11,573</b>	<b>924,624</b>	<b>1,063,318</b>	-	-	-

Source: DGCF, 2015

Plotting annual data on mean weight by fish from total number and weight during 2011 – 2014 were showed in Appendix 4.

## 6. Research activities

Some annual research projects to strengthen scientific and technical basis of data base on tuna fisheries are activities that has been regularly improved since 2013. The project are as follows :



- Gut weight ratio based on onboard observer were carried out to measure the gut-loss aspects since early this year. Limited number of specimens are available and still being updated up to the next fishing seasons.
- Collecting SBT otolith in spawning ground is still the major activity to provide data base. This regular activity under supervised by CSIRO scientist.
- Collecting sample to support close kin analysis in collaboration with CSIRO-Australia were regularly carried out.

## 7. Acknowledgements

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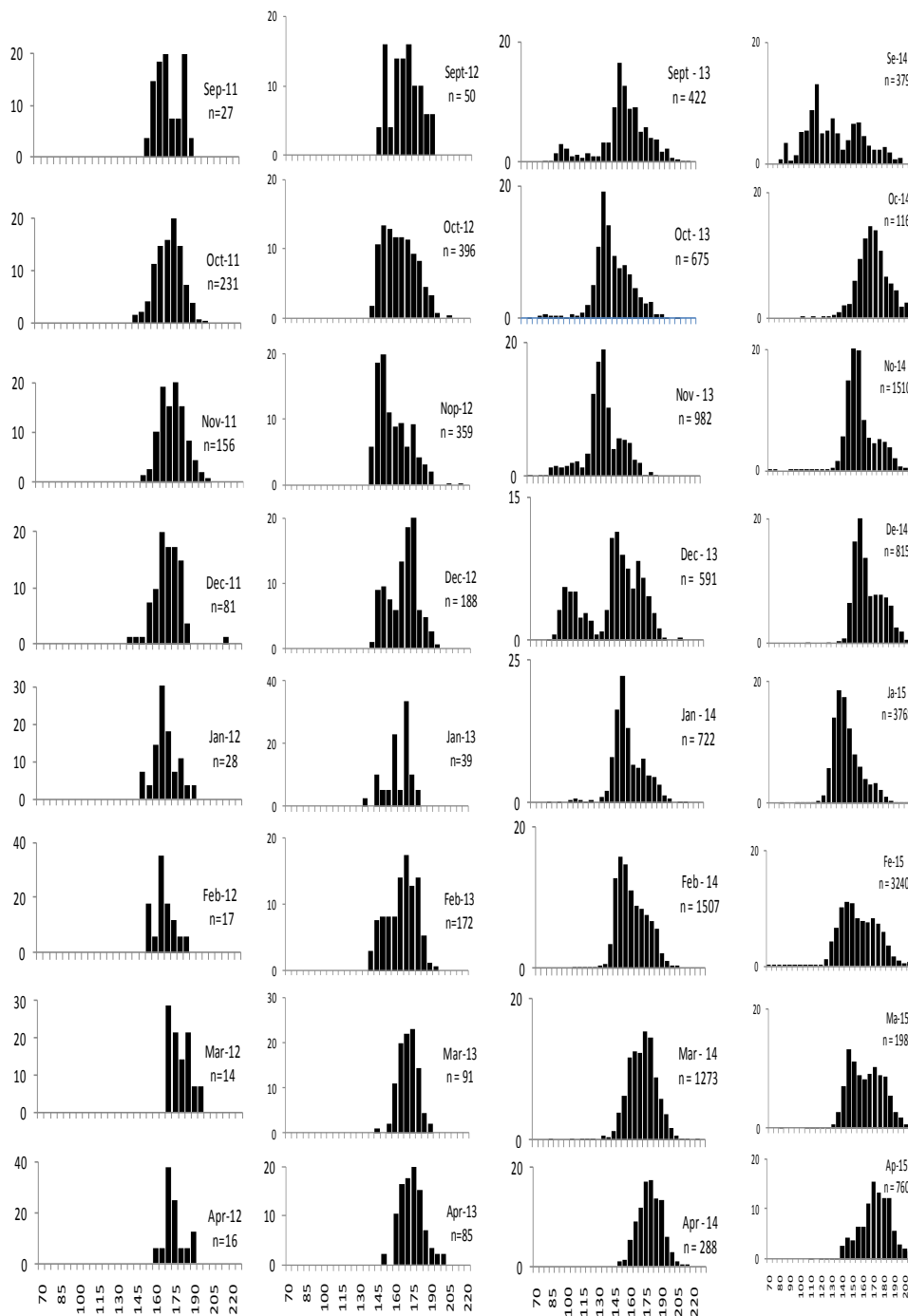
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Appendix 1.

Table 5. Annual catches (tons) of SBT reported to CCSBT 2004-2014

Year	Total catch of SBT (tons) – Indonesia		
	Reported to CCSBT	National Fisheries Statistics	Catch estimate
2004	633	665	613
2005	1,726	1,831	1,690
2006	598	747	558
2007	1,077	1,079	1,077
2008	926	891	905
2009	641	641	641
2010	496	474	580
2011	700	700	769
2012	910	910	817
2013	1,383	1,383	722
2014	1,037	1,037	1,102

Appendix 2. Length frequency distribution of all individual SBT during September 2011 to April 2015 (Port sampling Benaoua).



Appendix 3.

Table 6. List of Ecologically Related Species 2005 – 2014 (Scientific observer)

Code	Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
B1	seagull	0	0	4	25	1	0	0	0	0	1
B2	white albatross	0	0	3	0	0	0	0	0	0	0
B3	black albatross	0	0	6	0	0	0	0	9	0	0
BAR	Baracuda	4	11	3	8	25	8	2	11	0	4
BSH	Blue shark	55	427	386	192	44	80	4	381	37	63
BTS	Bigeye Thresher shark	1	0	0	0	0	1	5	0	1	0
BWL	Pomfret	186	199	410	643	777	263	31	1	194	232
CCB	Spinner shark	0	9	30	6	10	0	0	1	4	17
CCL	Common Blacktip Shark	1	3	0	0	0	0	0	0	0	0
CCP	Sandbar Shark	5	0	0	0	0	0	0	0	0	0
CDF	Common dolphinfish	10	34	122	99	55	13	18	25	11	15
CSK	Crocodile shark	37	119	36	96	35	305	69	157	48	90
DAV	Pelagic stingray	142	643	390	607	1117	547	467	409	914	511
DKK	Leatherback turtle	0	1	0	0	0	0	1	0	0	0
DOL	Dolphin	1	5	0	2	0	0	1	0	0	0
EIL	Brilliant pomfret	0	0	0	0	1	0	2	16	5	0
FAL	Silky Shark	0	36	7	2	11	12	0	0	0	0
HAR	Long nose chimaeras	11	10	11	31	19	8	22	80	22	3
LEC	Escolar	0	0	0	0	0	72	4	1387	284	666
LKV	Olive ridley turtle	0	3	2	11	2	7	1	5	6	12
MON	Moon fish	8	28	109	34	18	28	51	971	51	29
MOX	Ocean Sunfish	0	4	5	55	31	9	2	9	11	3
MSK	Mako sharks (Lamnidae)	3	19	7	1	3	3	0	9	1	0
MSO	Mako sharks ( <i>Isurus oxyrinchus</i> )	0	1	28	15	9	1	0	2	2	2
MSP	Mako sharks ( <i>Isurus paucus</i> )	1	1	4	11	7	0	0	1	0	0
NGA	Lancet Fish	400	1025	2009	1535	905	933	1184	1156	1738	921
OCS	Oceanic whitetip shark	0	2	14	4	10	14	7	4	2	8
OHR	Other Hair tail fish	1	0	280	81	27	17	0	0	1	0
OIL	Oilfish	117	636	592	480	348	274	135	65	7	58
RME	Devil Ray	0	2	1	0	1	1	0	0	0	1
RMJ	Manta ray, Japanese devilray	0	1	0	3	1	0	0	0	1	1
SPL	Hammerhead sharks ( <i>Sphyrna lewini</i> )	0	0	0	1	0	0	1	0	0	0
SPY	Hammerhead sharks (Sphyrnidae)	1	1	6	9	3	1	0	2	1	0
SPZ	Hammerhead sharks ( <i>Sphyrna zygaena</i> )	0	0	3	0	3	0	0	0	0	0
SSD	Shortnose spurdog	9	35	63	34	22	0	0	0	0	0
SSH	Silky Shark	0	0	0	0	10	3	0	0	0	1
TCR	Pomfret	0	0	0	0	0	1	24	60	91	90
THR	Thresher sharks nei	6	4	1	1	18	1	0	0	0	0
TIG	Tiger shark	0	0	2	3	1	0	0	0	1	0
TRF	Tapper tail ribbon fish	0	0	0	0	3	0	2	35	3	1
TRT	Turtle	0	0	0	0	14	25	0	2	0	0
TSK	Thresher sharks (Alopiidae)	3	4	6	2	2	0	1	2	1	2
TSP	Thresher sharks ( <i>Alopias pelagicus</i> )	1	8	5	5	0	0	0	3	1	0
TSS	Thresher sharks ( <i>Alopias superciliosus</i> )	1	20	4	0	1	0	0	2	1	1
TST	Sickle pomfret	0	0	0	0	0	14	19	87	60	110
TTH	Hawksbill turtle	0	0	0	0	2	0	0	0	0	0
TTX	Marine turtles nei	0	3	3	0	0	0	0	0	0	0
TUG	Green turtle	0	1	0	0	4	0	0	0	0	0
WAH	wahoo	15	17	96	233	27	25	26	41	60	96
<b>TOTAL</b>		<b>1019</b>	<b>3312</b>	<b>4648</b>	<b>4229</b>	<b>3567</b>	<b>2666</b>	<b>2079</b>	<b>4933</b>	<b>3559</b>	<b>2938</b>

## Appendix 4

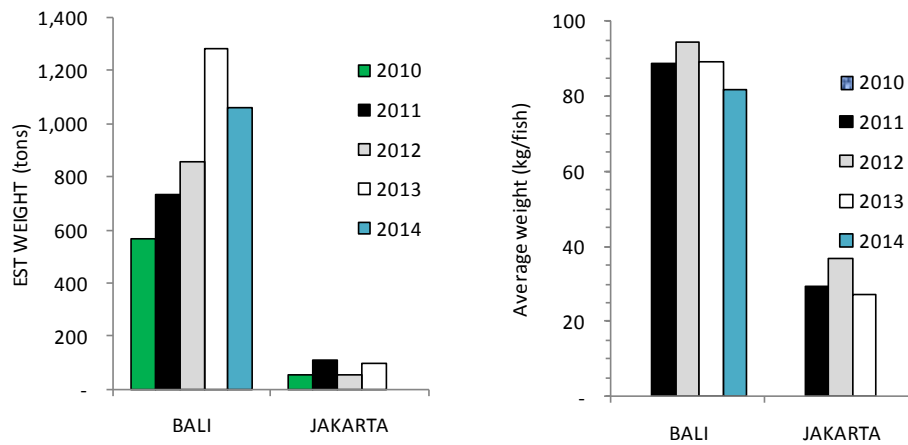


Figure 5. Annual SBT landing by main fishing ports (left) and average weight of fish (right) from 2010 – 2014

Source : DGCF (2010-2014)

Table 7. Updated annual activities of scientific observer based in Benoa Bali in 2005 and 2014

Year	No. Of Obs	No. Of Trips	No. Of Company	Total Day at Sea	Days/Trip	Avg (d/trip)
2005	6	6	1	251	19 - 22	20
2006	6	19	5	758	7 - 99	39
2007	6	14	5	648	21 - 108	34
2008	5	15	7	481	23 - 66	30
2009	5	14	8	535	15 - 59	38
2010	5	8	4	240	40 - 50	50
2011	5	6	3	210	30 - 50	40
2012	6	7	5	496	12 - 90	83
2013	5	3	3	170	52 - 60	57
2014	6	5	4	242	16-72	48